

**WHAT IS CLAIMED IS:**

1. An application development tool, comprising:  
a plurality of modality-specific editors for generating one or more  
modality-specific representations of an application;  
5 a model generator for generating a modality-independent representation from a  
modality-specific representation and for generating a modality-specific representation  
from the modality-independent representation; and  
a plurality of rendering units for rendering corresponding modality-specific  
representations for view by a user.
- 10 2. The application development tool of claim 1, wherein the rendering units  
comprise browsers.
3. The application development tool of claim 1, wherein at least one  
modality-specific editor comprises a WYSIWYG (what you see is what you get) editor.
4. The application development system of claim 1, further comprising a  
15 display for displaying a view of the modality-independent representation.
5. The application development tool of claim 4, wherein a portion of the  
displayed modality-independent representation is highlighted to indicate that the portion

was non-deterministically selected by the tool based on a modality-specific representation.

6. The application development tool of claim 1, wherein a modification in a modality-specific representation is automatically reflected in the modality-independent representation and at least one other modality-specific representation.

7. The application development tool of claim 1, further comprising means for flagging a component of a modality-specific representation to indicate that the interaction associated with the component is not synchronized across other modality-specific views.

8. The application development tool of claim 1, wherein each modality-specific editor comprises a plug-in.

9. The application development tool of claim 1, wherein the tool supports a single authoring programming model.

10. The application development tool of claim 9, wherein the single authoring programming model comprises an interaction-based programming model.

11. The application development tool of claim 10, wherein the interaction-based programming model comprises an interaction model to describe user interaction with the application and a data model to describe data that is manipulated during the interaction

5 12. The application development tool of claim 11, wherein the interaction-based programming model further comprises meta-information for customizing the application to one or more particular channels.

13. The application development tool of claim 1, wherein the tool supports a multiple authoring programming model.

10 14. The application development tool of claim 13, wherein the multiple authoring programming model comprises a plurality of channel-specific snippets for each of a plurality of modalities that are synchronized with each other.

15 15. The application development tool of claim 14, wherein the synchronization between channel-specific interaction components are expressed by events in one channel-specific snippet that triggers an event handler in another channel-specific snippet.

16. A method for authoring an application, comprising the steps of:  
editing a first modality-specific view of the application;  
updating an application model in response to the editing of the first modality  
specific view; and

5 adapting a second modality-specific view of the application based on the updated  
application model.

17. The method of claim 16, further comprising the step of rendering a  
modality-specific view using an associated browser.

10 18. The method of claim 16, wherein the application model comprises an  
interaction logic and customization meta-data page.

19. The method of claim 16, further comprising the step of automatically  
generating a corresponding modality-specific representation for each modality supported  
by the application through a transformation of the application model.

15 20. The method of claim 16, further comprising the step of automatically  
generating the application model from a modality-specific representation generated  
during the editing step.

21. The method of claim 16, further comprising the step of accessing and editing the application model.

22. The method of claim 21, comprising the step of displaying the application model in a window in one of a DOM (document object model), text, and symbolic  
5 representation.

23. The method of claim 22, further comprising the step of highlighting a portion of the displayed application model that were built non-deterministically.

24. The method of claim 16, wherein the application comprises a  
10 multi-channel application, wherein a given page comprises snippets associated with the first and second modality-specific views.

25. The method of claim 16, wherein the method steps are performed by an application authoring tool.

26. A program storage device readable by a machine, tangibly embodying a  
15 program of instructions executable by the machine to perform method steps for authoring an application, the method steps comprising:

editing a first modality-specific view of the application;

updating an application model in response to the editing of the first modality  
specific view; and

adapting a second modality-specific view of the application based on the updated  
application model.

5           27.     A method for authoring an application, comprising the steps of:  
  
separately editing a plurality of modality-specific views;  
  
automatically generating a modality-specific model for each view; and  
  
merging blocks of the modality-specific models to generate a single representation  
of an application model.

10           28.     The method of claim 27, further comprising adding synchronization  
information to merged blocks.

            29.     The method of claim 28, wherein the application models comprises a  
pseudo DOM (document object model) representation of the application, wherein  
interaction components comprise blocks in each modality that are synchronized with each  
15   other.

            30.     The method of claim 27, wherein the method steps are performed using a  
application development tool